# PATENT SPECIFICATION

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## (54) PACKAGING BAG FOR BREAD

(71) We, BREVETEAM S.A., a Swiss Company, of 13 Chemin Riedle, CH 1700 Fribourg 7, Switzerland, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a packaging bag for bread. The object of the invention is to provide a packaging bag which is suitable for packaging bread in a hot state as it leaves the oven and which can protect its contents against soiling. The latter feature is particularly important in self-service shops, where the merchandise is stored on open racks from where it is picked up by the shoppers. On the other hand the package should not impair the crustiness and the taste of the bread.

According to the present invention there is provided a packaging bag for bread made of a film material characterized in that the walls of the bag are provided with at least 500 slits per dm², each slit having a length of 2 to 6 mm, and at least one of the lips of each slit being shifted perpendicularly to the plane of the film such that, when viewed perpendicularly to the plane of the film the slit appears substantially closed and that in a side view parallel to the plane of the film the opening of the slit is visible. The film material may be a thermoplastic synthetic material such as low density polyethylene or low density polyethylene polymerized with 2% to 8% by weight of vinyl acetate.

Some embodiments of the invention will now be described with reference to the attached drawing, wherein:

Fig. 1 is a view of one form of an empty packaging bag according to the present invention;

Fig. 2 illustrates a loaf of bread packaged in such a packaging bag;

Fig. 3 illustrates a specific arrangement of slits in the bag wall;

Fig. 4 illustrates another arrangement of slits;

Fig. 5 shows a detail of the bag wall provided with slits; and

Fig. 6 is a sectional view along the line I—I of the detail shown in Fig. 5.

The packaging bags as illustrated in the drawing are made from a heat sealable, transparent film or sheet material in the form of a continuous web. A packaging bag 3 is obtained in the conventional way by superimposing two film webs, cutting these webs into sheets of predetermined length and sealing the borders 1 of the sheets on three sides. Fig. 2 illustrates a loaf of bread 2 packed into such a bag. In the bakery industry usually the bread is packed in a still hot state at the exit of the oven. Packaging machines of known design are used for that purpose. One of these types of machines is provided with a supply of film material either in the form of cut sheets or in the form of webs. The machine lays the loaves in one automatic cycle between two sheets of film, seals the edges of the sheets so that a bag is formed, severs, if necessary, the filled bag and deposits it on a conveying belt. Other known packaging machines are supplied with a pile of pre-assembled bags. The invention, therefore, is not limited to a special kind of such machine.

It is important that the packaging bag allows for the rapid evaporation of a certain amount of humidity from the still hot bread. If the evaporation of water in the cooling period after delivery from the oven is too slow, the bread becomes stale and loses its crustiness. The excess humidity remaining results in premature mouldiness. The necessity for rapid evaporation of water within the cooling period excludes also the use of bags made of Cellophane (Registered Trade Mark) films (cellulose acetate), since water vapor diffusion through Cellophane is very slow. Nowadays the most suitable transparent film material is made from synthetic polymers. The most common material consists in blown films of polyethylene. These films are suitable for heat sealing without any adhesive coating.

Attempts have been made to permit evaporation of water from bread packed in bags of such synthetic materials by means of

punching holes into the bags. However, experience has shown that a relatively large total opening width is necessary in order to permit sufficient evaporation of humidity from the bread. However, this increases also the access of dust to the contents. Furthermore, the bread is also exposed to direct contact with hands.

The film material which is used for manufacturing the bags is provided with openings which will now be described in detail. They allow a convenient evaporation of water through the bag but nevertheless sufficiently protect the contents from soiling and from direct contact with hands.

As is illustrated in Fig. 1, the wall of the bag is provided with a great number of slit-like openings 4. These openings are preferably arranged in parallel rows in order to allow an economical procedure. Figs. 3 and 4 show examples of such arrangements, i.e. with slits offset as shown in Fig. 3 or with slits aligned as shown in Fig. 4. Portions of the bag wall may also be left free from openings.

These openings are obtained by cutting the film through its whole thickness over a short length, of 2 to 6 mm. One lip 5 of each slit is shifted relative to the other lip 6 in a direction perpendicular to the plane of the film. The extent of the displacement D (Fig. 5) is chosen in accordance with the thickness of the film such that only a slit-like opening 4 is obtained for the passage of gases through the wall of the bag. Thus the opening is normal to the plane of the film. Viewed from the top the openings appear as being closed, whereas in a side view parallel to the plane of the film they are fully visible.

By the cutting operation the lips of the slits are distended. Provided that the film material has some rigidity this prevents the lips 5 springing back into the plane of the film by their own elasticity. The frictional resistance between the two lips of a slit contributes to the same result. Even on the assumption that during the transport and stocking of the packed bread some portions of the bag wall may be flattened by external forces, for instance by the pressure between the merchandise and its support, and thus be made impermeable, enough openings will remain in the bag wall for ventilation.

The total opening area in the bag wall is constituted by a very great number of separate openings 4, the opening widths of which are so small that they do not allow the access of dust. In contrast to the bags prvided with punched holes, the packed merchandise is not exposed to direct contact with hands. On the contrary, upon pressure by the fingers the lips 5 of the slit are pressed down into the plane of the film, thus closing the openings 4. As in turn this concerns only a few openings 4, there remains enough total opening area in the bag wall for the passage of gases.

*First embodiment*

A blown film consisting of low density polyethylene (specific density 0.930 g/cm$^3$, melt index MFI 2, 16 kp, 190°C=ca. 0.20 g/10 min, i.e. a flow of 0.20 gms in 10 mins through a standard test orifice of diameter 2.0, 95 mm is achieved under a force of 2.16 kp at a temperature of 190°C) 70 μm thick is processed by a slitting tool. Slit-like perforations arranged in parallel rows as illustrated in Fig. 3 and producing a film section as illustrated in Fig. 5 are formed.

The whole surface of the bag wall was scattered with openings such that per 1 dm$^2$ of film area there were approx. 750 slits of a length of 4 mm. The slitted films were formed into bags and heat sealed on three sides by a conventional sealing device. The bags were sized for four rolls of a weight of 65 to 68 g each. The rolls were packed hot as they left the oven and stored under the same conditions as other bread of the same batch. The weight losses were determined after 3, 6, 10 and 24 hours. At the same time unpacked rolls were stored. Other comparative values were obtained with rolls packed in paper bags as usually used for packaging breads and with other rolls packed in bags made of perforated polyethylene films. The perforations of the latter bags were punched with a hole diameter of 6 mm and with an average number of 3.6 holes per dm$^2$. The table here-below gives the weight losses in percent relative to the initial weight (average values for 4 rolls).

| type of bag | initial weight when leaving the oven g | weight loss relative to the initial weight | | | |
|---|---|---|---|---|---|
| | | after 3 hrs. % | after 6 hrs. % | after 10 hrs. % | after 24 hrs. % |
| unpacked | 65,3 | 1,3 | 2,6 | 4,1 | 9,3 |
| paper bags | 67,8 | 1,3 | 2,3 | 3,4 | 8,1 |
| bags according to the invention | 66,8 | 1,1 | 2,2 | 3,5 | 7,3 |
| punched film of polyethylene | 66,7 | 0,2 | 0,5 | 0,8 | 1,7 |

The evaporation of water can be considered as being approximately equivalent to the weight loss. As the table shows, the values are nearly the same for the samples packed in paper bags as those packed in bags according to the invention, whereas the values for the samples packed in punched polyethylene bags are far below these values. Corresponding differences were noted with hand crushing tests.

The rolls packed in punched film bags were tough even immediately after cooling and stale. The rolls which had been packed in bags according to this embodiment of the invention were still crusty even after 10 hours.

*Second embodiment*

The starting material was blown film 70 $\mu m$ thick of low density polyethylene copolymerized with 3% by weight vinylacetate (effective specific density 0.926 g/cm$^3$, melt index MFI 2.16 kp, 190°C=1.4 g/10 min). This film material was more flexible than the film material of the first embodiment.

In order to determine the influence of the film stiffness on the suitability of the material for packaging bread, the air permeability was measured under the same test conditions and with the same arrangement of the openings 4 as the bags described before. The values were determined for a test-area of 50 cm$^2$ and for an excess pressure on one side of 20 cm water-gauge. In the average the following values were obtained:

| | |
|---|---|
| First embodiment (film material relatively stiff): | 1180 l/m$^2$s |
| Second embodiment (film material relatively flexible): | 765 l/m$^2$s |

The difference in the air permeability values may be explained by the fact that the lips of the slits of the more flexible film material have a stronger tendency to fall back into the film plane than is the case with the stiffer film. The opening widths of the slits are thus reduced. The choice of material is not limited to the cited two embodiments, for instance a film of cellulose acetate may be used. Provided that the materials are unobjectionable from the hygienic point of view all synthetic materials which can be processed into thin and relatively stiff but not brittle films are suitable for the packaging bread. It does not matter if bags are formed by heat sealing of the foils, by bonding by adhesives, by stitching with sewing-thread or by staples or by any other known means.

WHAT WE CLAIM IS:—

1. Packaging bag for bread made of a film material, characterized in that the walls of the bag are provided with at least 500 slits per dm$^2$, each slit having a length of 2 to 6 mm, and at least one of the lips of each slit being shifted perpendicularly to the plane of the film such that, when viewed perpendicularly to the plane of the film the slit appears substantially closed and that in a side view parallel to the plane of the film the opening of the slit is visible.

2. Packaging bag according to claim 1, wherein the film is of thermoplastic synthetic material.

3. Packaging bag according to claim 2, wherein the film is of low density polyethylene.

4. Packaging bag according to claim 2, wherein the film is of low density polyethylene which is polymerized with 2 to 8% by weight of vinyl acetate.

5. Packing bag according to claim 1, wherein the film is of cellulose acetate.

6. Packaging bag according to claim 1, wherein the slits are arranged in parallel

rows and offset from one row to the adjacent row.

7. Packaging bag according to claim 1, wherein the slits are arranged in parallel rows, said slits terminating on lines perpendicular to the rows.

8. Packaging bag substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

9. Bread packaged within a packaging bag according to any one of claims 1 to 8.

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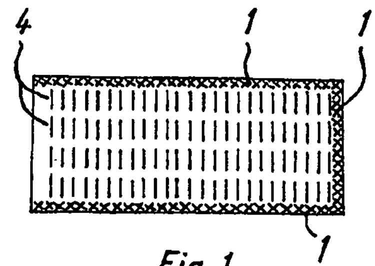


*Fig. 1*

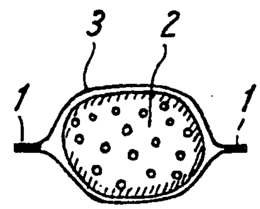


*Fig. 2*

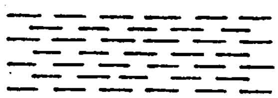

*Fig. 3*

*Fig. 4*

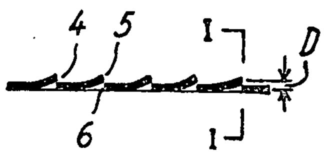


*Fig. 5*

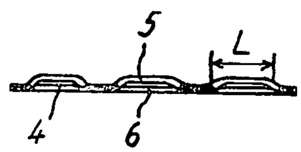


*Fig. 6*